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National Laboratory Day

Dan Ginosar

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Critical Materials Institute
AN ENERGY INNOVATION HUB

National Laboratory Day

October 9, 2019

Dan Ginosar
CMI Deputy Focus Area Lead



Mission & Strategy

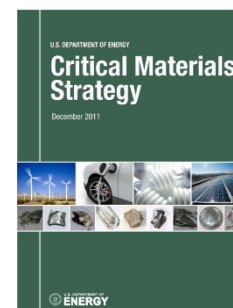
Mission:

Accelerate the development of technological options that assure supply chains of materials essential to clean energy technologies – enabling innovation in US manufacturing and enhancing energy security.

Critical materials (a) provide essential and specialized properties to advanced products or systems, (b) have no easy substitutes, and (c) are subject to supply risk.

Strategy:

- Diversify our sources;
- Develop substitutes to the existing materials;
- Drive better use of the existing supplies through efficient manufacturing, recycling and re-use.



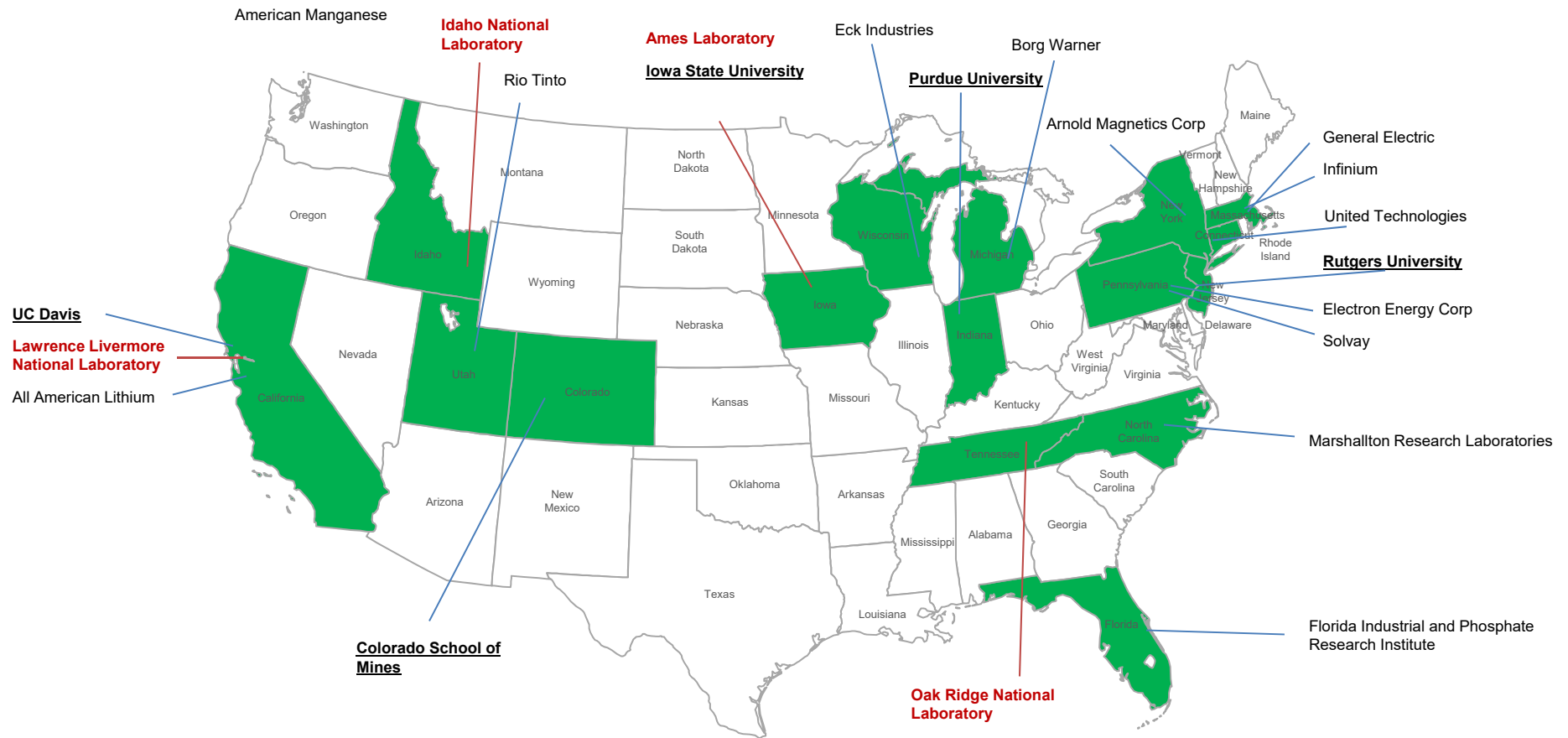
Cal Materials in Energy Systems

	REEs *	Li	Co	C**	Ga	In	Mn	V	PGM
Vehicles/ Motors	X	X	X	X			X	X	X
Storage		X	X	X			X	X	
Solar/ Semi- conductors					X	X			
Catalysts	X								X
Lighting	X				X	X			
Nuclear	X		X			X			
Wind	X								

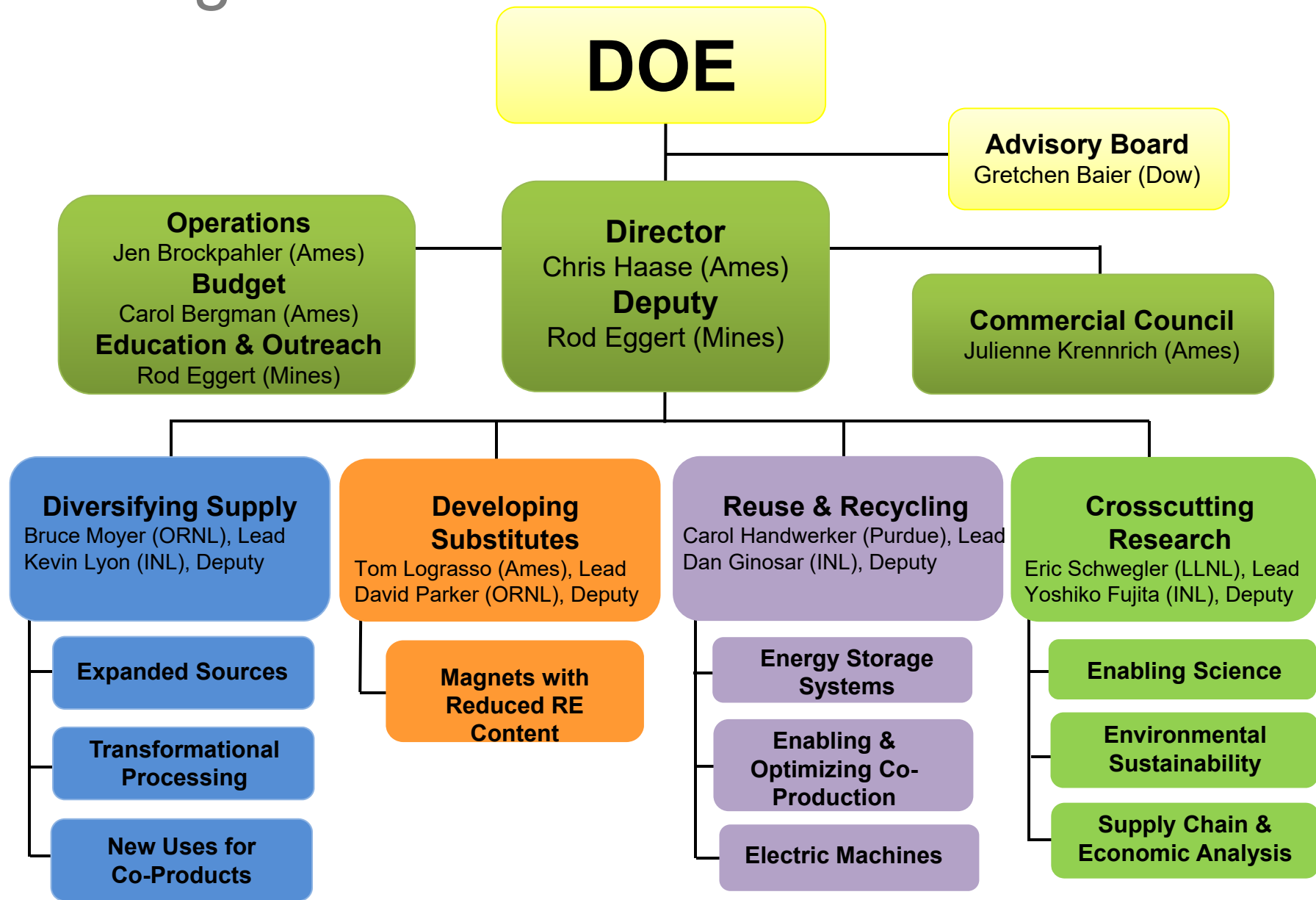
- = Selected rare earths: Nd, Pr, Dy, Sm (magnets); La, Ce (catalysts)

** = Battery-grade graphite

CMI: One integrated team with complementary capabilities



CMI Organization



Accomplishments

287
Refereed
Publications

120
Invention
Disclosures

350
CMI Participants*

56
Patent
Applications

10
Awarded Patents

8
Technology
Licenses

4
R&D 100 Awards

50
CMI Affiliates*

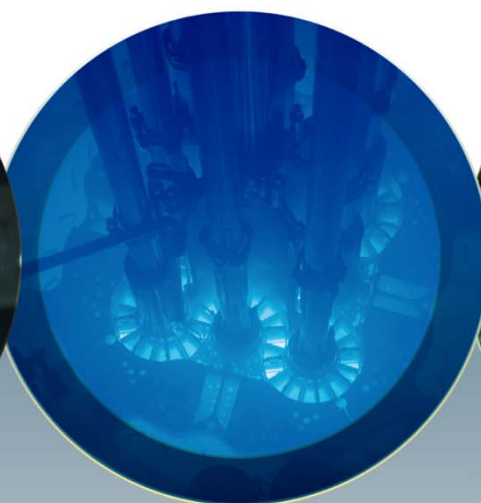
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CMI Team
Members*

is Positioned to Address the World's Energy and Security Challenges



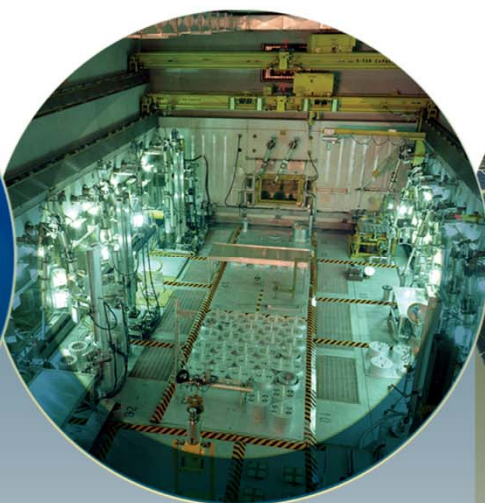
Nuclear S&T

Advanced reactor design
Optimization
Nuclear fuels and
materials
Fuel cycle technologies
Light water reactor fleet
Sustainability



Advanced Test Reactor

- Steady state neutron irradiation of materials and fuels
 - Naval Nuclear Propulsion Program
 - Industry
 - National laboratories and universities



Materials and Fuels Complex

- TREAT – Transient testing
- Analytical laboratories
- Post-irradiation examination
- Advanced characterization
- Fuel fabrication
- Space nuclear power and isotope technologies



Energy and Environment S&T

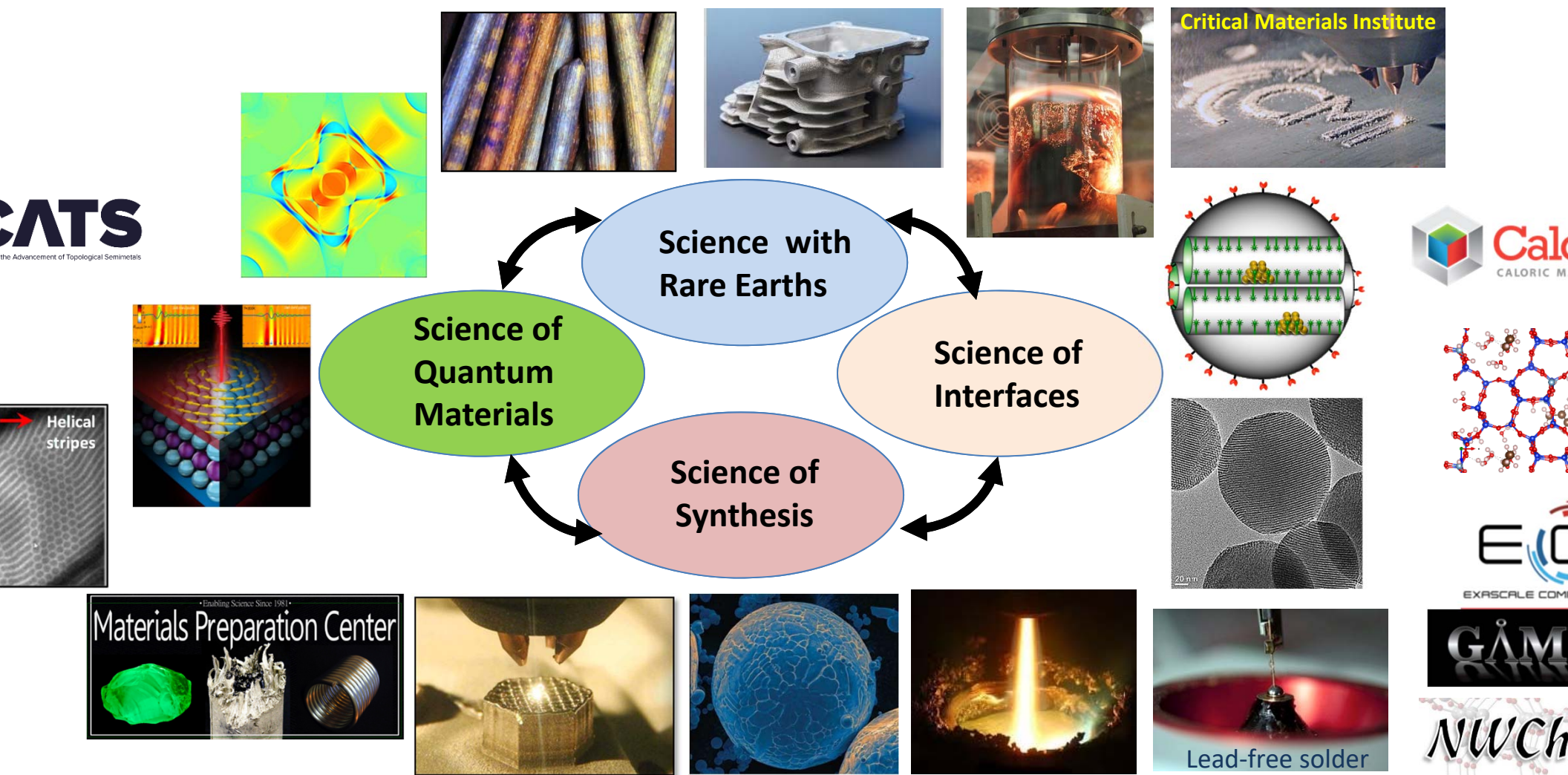
- Advanced transportation
- Environmental sustainability
- Clean energy
- Advanced manufacturing
- Biomass



National and Homeland Security S&T

- Critical infrastructure protection and resilience
- Nuclear nonproliferation
- Physical defense systems

Laboratory accelerates materials design, discovery and deployment by transitioning from basic science to applied science to technology commercialization



LLNL's mission is to strengthen national security through world-class science, technology, and engineering



Stockpile
Stewardship



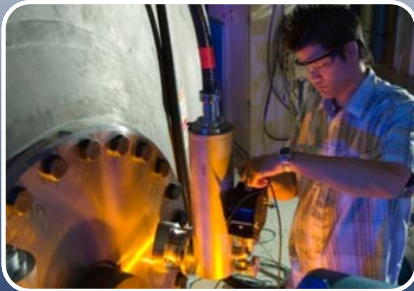
All-WMD Threat
Reduction



Multi-Domain
Deterrence



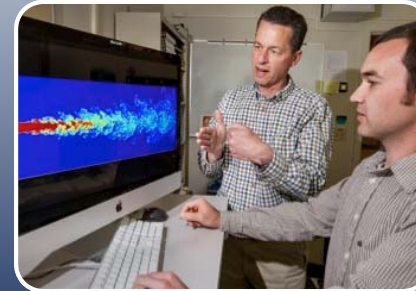
Energy and
Climate Security



Science



Engineering



Computing

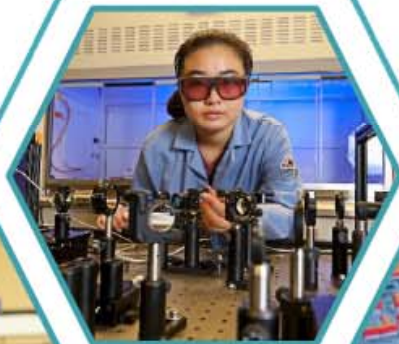
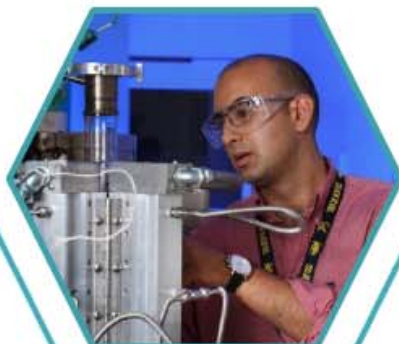
ORNL's goal:
To be the world's premier
research institution



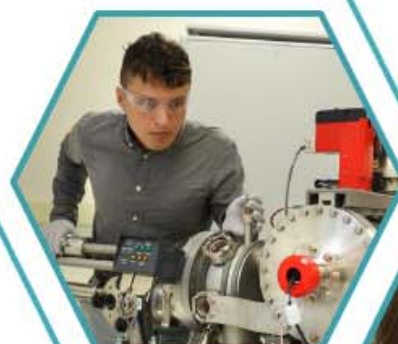
Conduct
world-
leading
research



Deliver
innovative
break-
throughs



Ensure
national
security



Secure
energy
future



ORNL's distinctive facilities bring thousands of R&D partners to Tennessee each year - Building Technologies Research and Integration Center; Carbon Fiber Technology Facility; Center for Nanophase Materials Sciences; High Flux Isotope Reactor; Manufacturing Demonstration Facility; National Transportation Research Center; Spallation Neutron Source; Oak Ridge Leadership Computing Facility

Earth's Element Uncertainty



Critical Materials Strategy Summary

The report examines the role of critical materials in the clean energy technologies of the 2010 Critical Materials Strategy. It highlights the importance of these materials in the production of clean energy technologies, such as electric vehicles, wind turbines, and solar panels. The report also identifies the challenges associated with the supply of these materials and provides recommendations for addressing these challenges.

- In the past year, DOE and other stakeholders have scaled up work to address these challenges. This includes new funding for priority research, development of DOE's first critical materials research plan, international workshops bringing together leading experts and substantial new coordination among federal agencies working on these topics.
- Building workforce capabilities through education and training will help address vulnerabilities and realize opportunities related to critical materials.
- Much more work is required in the years ahead.

This report is focused on several clean energy technologies expected to experience high growth in coming years. The scenarios presented are not predictions of the future. Future scenarios are subject to change as more information becomes available.

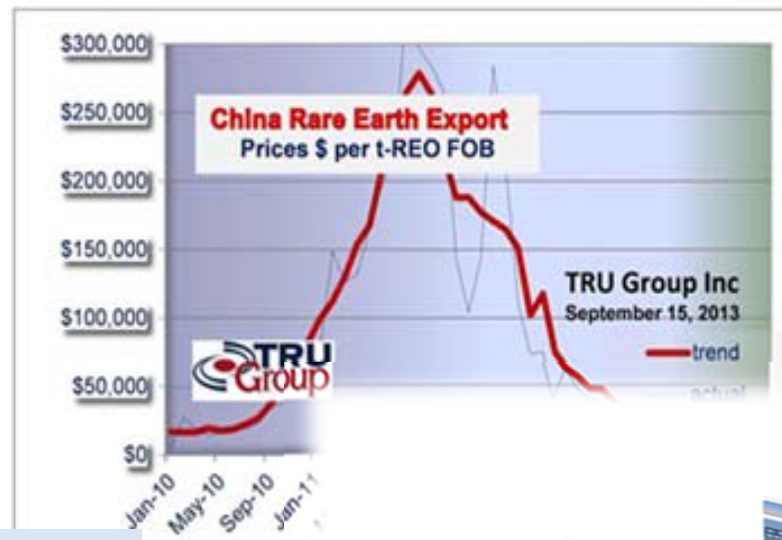


Figure 1. Short-Term (present-2015) Criticality Matrix

